Sydney Tar Ponds Clean-Up

Funded By the Canada/Nova Scotia Subsidiary Agreement
Dated November 7, 1986

PCB Contamination
Interim Report

October 1992

ACRES Acres International Limited

1 INTRODUCTION

This report presents a summary of the results of a field sampling and analytical program carried out during the summer of 1992 in the South Pond area of the Sydney Tar Ponds. The purpose of the sampling program was to delineate, in terms of area and depth, the extent of PCB contamination encountered during routine sampling/analysis preceding the start of dredging.

The report also presents a brief review of two storage/removal options for the contaminated material.

2 FIELD SAMPLI[illegible]PROGRAM

2.1 Initial Sampling

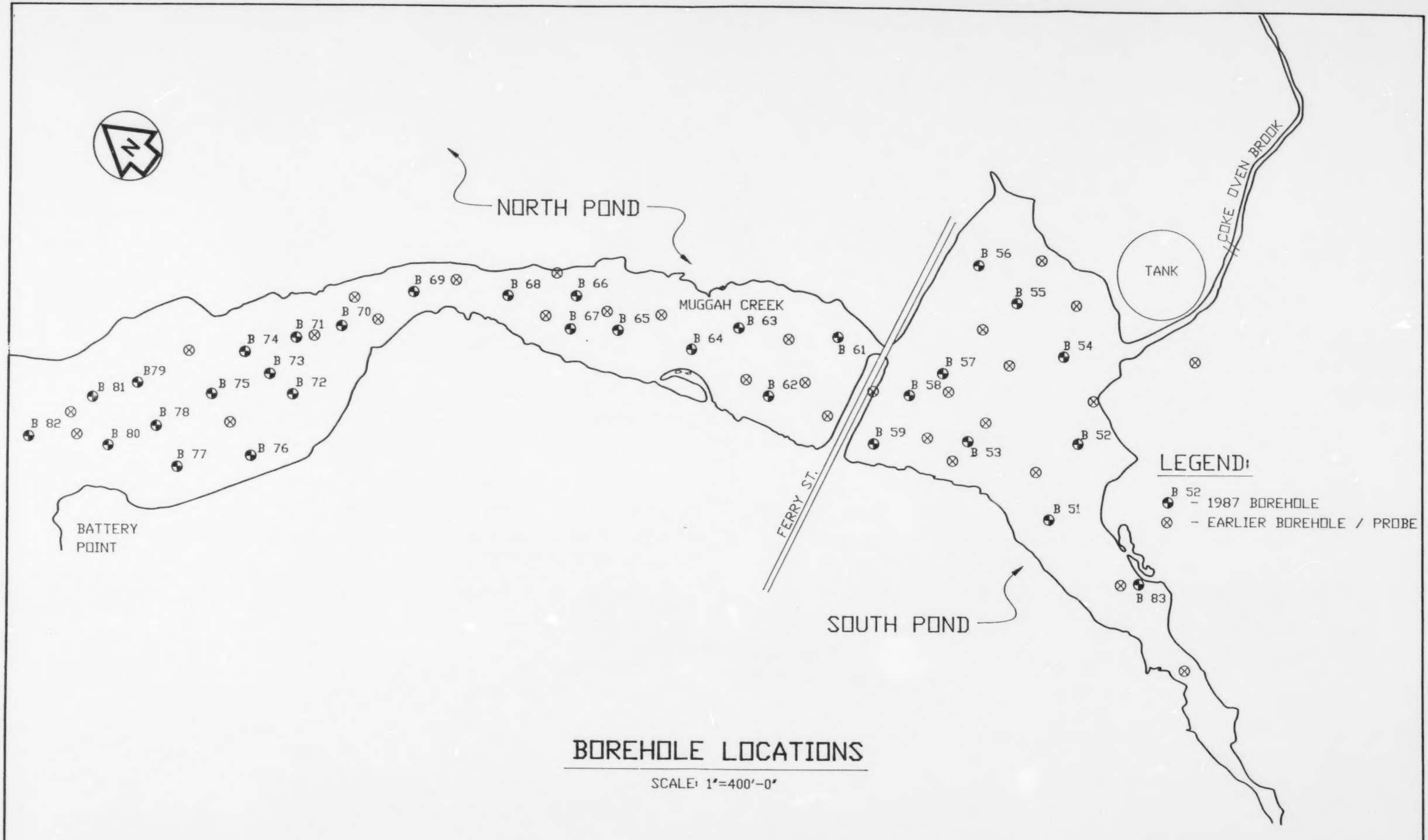
In the fall of 1987, a borehole sampling program was carried out in the North and South Tar Ponds. Figure 1 shows the overall area of the Tar Ponds and the locations of the boreholes. In addition to the thirty-two boreholes drilled during that program, information was available from boreholes and test probes carried out in previous work by Acres and others.

Samples obtained from the 1987 borehole program were analysed for PAH's, HNC's and PCB's. The borehole information was also used to refine the estimates of sediment volume in the ponds and as well to define subsoil conditions as they would relate to excavation methodology.

A total of twenty-seven samples from the borehole program were analysed for PCB's, and the results are presented in a later section. Samples were taken from a variety of depths from eight boreholes in the South Pond and ten boreholes in the North Pond (Figure 1). None of the samples analysed showed PCB concentrations approaching the value of fifty parts per million, the concentration at which a material is defined as a PCB waste. The highest value obtained was nine parts per million at one of the locations, and all other values were below five parts per million with over half of the samples showing less than one part per million. Concentrations were reported on a wet weight basis.

2.2 1992 Program

The Nova Scotia Department of the Environment advised that the operating permit for the facility will contain a stipulation that no material is to be incinerated at the Tar Ponds



BOREHOLE LOCATIONS

SCALE: 1"=400'-0"

Fig.1

BOREHOLE LOCATIONS

SYDNEY TAR PONDS CLEAN-UP

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facility unless it is analysed for PCB content and shown to contain less than fifty milligrams per kilogram (50 ppm) of PCB. The screening is to be conducted on the basis of one test per 300 cubic metres of material.

In early summer of 1992, an area was selected for initial sediment excavation, in the South Pond, near the north east corner. In accordance with the Department of Environment requirements, a sampling program was carried out over a grid which would ensure one sample for each 300 cubic metres or less. Each grid measured approximately twelve metres by thirteen metres.

Initial analyses from this sampling indicated concentrations in excess of fifty parts per million in some areas, adjacent to the east shoreline of the South Pond.

Following a review of the initial results, the field sampling program was extended, in order to both define a non PCB contaminated area for the initial excavation, and also to delineate the extent of contaminated material. The sampling was performed on a sequential basis, using the results of each sampling set to determine areas for further sampling.

At each location, the sampling was normally over the top 0.38 metres (16 inches) of material, with the analyses representing the average concentration over this depth. In addition, nine sites within the zone of contamination were samples at four or five depths over the top forty centimetres of material to determine the variation of concentration with depth at these locations. The depth related samples were in addition to the samples obtained earlier at the same locations.

All the field sampling work, including ground control and positioning, sampling and containment of samples was carried out by the Sydney office of Washburn Gillis and Associates. The samples were then handled through the normal project chain of custody, for analysis by Research Productivity Council, the contract laboratory for organic analysis. Results were subjected to QA/QC review by C.J. Musial, the project QA/QC officer.

3 ANALYTICAL RESULTS

Figure 2 shows the grid used for the sampling program. Variations in grid spacing at the north limit of the South Pond are to ensure a greater number of samples in the deeper areas, thus maintaining the required ratio of one sample per 300 cubic metres of material. For each location sampled, the figure shows the PCB concentration in parts per million of PCB material, on a dry weight basis. Where no concentration is shown, the location

TRANSFER STATION

FERRY STREET

THIS BLOCK IS ONE ACRE

TANK

LEGEND:

- $\times^{1.3}$ – PCB CONCENTRATION IN PARTS PER MILLION (DRY WEIGHT)
- B 11 – BOREHOLE FROM EARLIER SURVEYS
- SO – SEWER OUTFALL
- AREA WHERE PCB CONTAMINATION EXCEEDS 50 PARTS PER MILLION, DRY WEIGHT BASIS.

OCTOBER 1992
SYDNEY TAR PONDS CLEAN-UP
SCALE: 1"=100'-0"

Fig.2

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was not sampled. As the material as sampled has a moisture content varying from 10% to 50%, the dry weight concentrations are higher than the measured concentration for in situ material by a factor of up to 100%. As an example, sediment with a moisture content of 30% and a measured PCB concentration of twenty-five parts per million would have a calculated dry weight concentration of thirty-six parts per million. The results shown are therefore always higher than the concentration measured on a wet weight basis. Although a wet weight measure of PCB contamination is representative of the in-situ characteristics of the sediments, Acres feels that the dry weight measure provides for a greater degree of environmental protection.

The red line in Figure 3 shows the extent of material contaminated in excess of fifty parts per million (dry weight basis) in the area sampled. As can be seen, the full extent of the contiguous contaminated area has not been delineated at the south end of the area, which is adjacent to the outlet of Coke Oven Brook. The highest concentrations are adjacent to the outlet of a major sewer at the north east corner of the South Tar Pond.

For the initial dredging, the area delineated by coordinates A9 to A1 and X9 to X1 was selected, as this area was well below the level of fifty parts per million.

Table 1 gives a summary of the PCB analyses carried out on samples from the 1987 program. These values are shown on a wet weight basis, as moisture contents were not available.

Table 2 gives a summary of the analytical results as given in Figure 2. For each sample location, the top and bottom depths of the sample, the wet concentration in parts per million as reported by the laboratory, the moisture content as sampled, and the calculated concentration on a dry weight basis are given. The sample number shown is the unique identification number assigned in the chain of custody process.

Table 3 gives the results for a further forty depth related samples. In each case, the top and bottom depth of the sample is shown (in fractions of a metre as measured). With the exception of location K1, adjacent to the sewer outlet, the PCB concentration is seen to fall off rapidly with increasing depth, with the highest concentrations occurring in the top 0.08 metre to 0.28 metre (the top three to eleven inches).

The four samples at location A2, were taken at a location determined previously to have a concentration of less than 50 ppm in the top fifteen inches, and the depth sampling showed that individual samples at various depths did not have concentrations in excess of 50 mg/kg (50 ppm).

TRANSFER STATION

FERRY STREET

49'-0" TYP.

K J I H G F E D C B A Z Y X W V U T S R Q P

19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0

B 59 B 58 B 57 B 17 B 11 B 33 B 55 B 56 B 54 BH 14 BH 1 P 12 P 8 P 7 JV 1 JV 2 JV 3 JV 5

INITIAL DREDGING AREA

THIS BLOCK IS ONE ACRE

TANK

LEGEND:

B 11 – BOREHOLE FROM EARLIER SURVEYS

– SEWER OUTFALL

– AREA WHERE PCB CONTAMINATION EXCEEDS 50 PARTS PER MILLION, DRY WEIGHT BASIS.

Fig.3

CONTAMINATED AREA
SYDNEY TAR PONDS CLEAN-UP
SCALE: 1"=100'-0"

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TABLE 1

8.10.92 1978 PCB RESULTS

SAMPLE LOCATION (BOREHOLE)	DEPTH TOP (m)	DEPTH BOTTOM (m)	PCB WET CONC. (mg/kg)	SAMPLE NO.
B51	0.00	.61	.350	114
B53	.61	1.22	.540	116
B54	0.00	.61	1.850	118
B56	0.00	.61	9.100	120
B57	.61	1.22	1.460	121
B58	1.83	2.43	.060	123
B58	2.44	3.05	.040	147
B59	0.00	.61	.320	144
B61	.61	1.22	.070	124
B66	0.00	.61	6.780	126
B66	1.83	2.44	.570	149
B66	2.43	3.05	.010	142
B66	2.43	3.05	.010	143
B66	2.43	3.05	.010	145
B66	2.43	3.05	.010	148
B67	0.00	.61	.060	128
B69	0.00	.61	1.640	139
B69	0.00	.61	3.450	140
B69	0.00	.61	1.990	141
B70	0.00	.61	4.290	129
B72	0.00	.61	4.490	130
B75	.61	1.22	1.970	132
B75	1.83	2.43	.140	133
B76	1.22	1.83	.010	146
B77	0.00	.61	3.130	135
B79	.61	1.22	2.420	150
B83	0.00	.61	3.210	136

TABLE 2

8.10.92 SAMPLE SUMMARY

LINE	ROW	DEPTH TOP (m)	DEPTH BOTTOM (m)	PCB WET CONC. (mg/kg)	IN-SITU MOISTURE	PCB DRY CONC. (mg/kg)	SAMPLE NO.
A	2	0.00	.38	9.9	.403	16.6	7189
A	3	0.00	.38	15.0	.414	25.6	7190
A	4	0.00	.38	2.6	.474	4.9	7191
A	5	0.00	.38	2.6	.437	4.6	7197
A	6	0.00	.38	1.7	.408	2.8	7203
A	7	0.00	.38	4.3	.411	7.3	7200
A	8	0.00	.38	2.4	.392	3.9	7209
A	9	0.00	.38	2.3	.410	3.9	7212
B	2	0.00	.38	56.0	.260	75.7	7193
B	3	0.00	.38	11.0	.453	20.1	7195
B	4	0.00	.38	5.9	.478	11.3	7196
B	5	0.00	.38	1.6	.432	2.8	7210
B	6	0.00	.38	4.0	.396	6.6	7205
B	7	0.00	.38	2.9	.399	4.9	7201
B	8	0.00	.38	.7	.438	1.2	7233
B	9	0.00	.38	1.1	.469	2.1	7229
B	10	0.00	.38	28.0	.367	44.2	7628
B	11	0.00	.38	5.7	.319	8.4	7632
B	12	0.00	.38	14.0	.329	20.9	7635
C	2	0.00	.38	22.0	.316	32.2	7222
C	3	0.00	.38	31.0	.445	55.9	7216
C	4	0.00	.38	8.2	.515	16.9	7227
C	5	0.00	.38	3.0	.312	4.4	7235
C	6	0.00	.38	3.0	.437	5.3	7234
C	7	0.00	.38	3.0	.454	5.5	7225
C	8	0.00	.38	3.0	.375	4.8	7230
C	9	0.00	.38	3.0	.415	5.1	7228
C	11	0.00	.38	1.0	.424	1.7	7371
C	12	0.00	.38	1.0	.342	1.5	7366
C	13	0.00	.38	11.5	.282	16.0	7364
C	14	0.00	.38	17.6	.278	24.4	7365
C	15	0.00	.38	24.0	.264	32.6	7631
C	16	0.00	.38	20.0	.240	26.3	7634
D	1	0.00	.38	347.0	.233	452.4	7219
D	2	0.00	.38	19.0	.424	33.0	7214
D	3	0.00	.38	18.0	.477	34.4	7223
D	4	0.00	.38	41.0	.473	77.8	7220
D	5	0.00	.38	3.3	.423	5.7	7224
D	6	0.00	.38	3.0	.445	5.4	7221
D	7	0.00	.38	2.5	.429	4.4	7217
D	8	0.00	.38	3.8	.404	6.4	7218
D	9	0.00	.38	3.0	.445	5.4	7215
D	11	0.00	.38	24.0	.544	52.6	7374
D	12	0.00	.38	2.1	.437	3.7	7372
D	13	0.00	.38	10.9	.440	19.5	7369
D	14	0.00	.38	60.4	.296	85.8	7370
D	15	0.00	.38	26.0	.246	34.5	7633
D	16	0.00	.38	23.0	.264	31.3	7630
E	1	0.00	.38	165.0	.300	235.7	7246
E	2	0.00	.38	217.0	.293	306.9	7244

TABLE 2

8.10.92 SAMPLE SUMMARY

LINE	ROW	DEPTH TOP (m)	DEPTH BOTTOM (m)	PCB WET CONC. (mg/kg)	IN-SITU MOISTURE	PCB DRY CONC. (mg/kg)	SAMPLE NO.
E	3	0.00	.38	13.0	.474	24.7	7245
E	4	0.00	.38	40.0	.393	65.9	7243
E	5	0.00	.38	12.7	.586	30.7	7240
E	6	0.00	.38	12.2	.431	21.4	7241
E	7	0.00	.38	7.1	.464	13.2	7242
E	8	0.00	.38	1.4	.444	2.5	7239
E	9	0.00	.38	1.0	.382	1.6	7237
E	11	0.00	.38	42.2	.249	56.2	7332
E	13	0.00	.38	97.7	.174	118.3	7314
E	15	0.00	.38	12.4	.213	15.8	7328
E	17	0.00	.38	15.5	.225	20.0	7329
E	19	0.00	.38	1.6	.241	2.1	7311
F	1	0.00	.38	139.0	.463	258.8	7248
F	2	0.00	.38	92.0	.185	112.9	7249
F	3	0.00	.38	7.6	.311	11.0	7250
F	4	0.00	.38	6.4	.263	8.7	7251
F	5	0.00	.38	13.3	.456	24.4	7252
F	6	0.00	.38	70.0	.305	100.7	7253
F	7	0.00	.38	24.2	.481	46.6	7254
F	8	0.00	.38	51.2	.394	84.5	7255
F	9	0.00	.38	272.0	.144	317.8	7256
G	0	0.00	.38	107.0	.078	116.1	7267
G	1	0.00	.38	55.8	.247	74.1	7266
G	2	0.00	.38	41.6	.313	60.6	7263
G	3	0.00	.38	29.6	.220	37.9	7264
G	4	0.00	.38	18.9	.414	32.3	7265
G	5	0.00	.38	46.9	.446	84.7	7262
G	6	0.00	.38	6.4	.384	10.4	7261
G	7	0.00	.38	49.3	.429	86.3	7260
G	8	0.00	.38	80.6	.320	118.5	7259
G	9	0.00	.38	74.9	.127	85.8	7258
G	10	0.00	.38	108.0	.299	154.1	7271
G	11	0.00	.38	19.5	.392	32.1	7335
G	13	0.00	.38	8.5	.330	12.7	7308
G	15	0.00	.38	1.5	.427	2.6	7334
G	17	0.00	.38	13.9	.336	20.9	7349
G	19	0.00	.38	12.6	.185	15.5	7350
H	0	0.00	.38	237.0	.028	243.8	7275
H	1	0.00	.38	42.3	.217	54.0	7278
H	2	0.00	.38	79.0	.328	117.6	7277
H	3	0.00	.38	122.0	.157	144.7	7276
H	4	0.00	.38	83.8	.280	116.4	7272
H	5	0.00	.38	15.9	.369	25.1	7273
H	6	0.00	.38	2.0	.286	2.8	7274
H	7	0.00	.38	2.0	.357	3.1	7269
H	8	0.00	.38	88.0	.189	108.5	7270
H	9	0.00	.38	8.0	.116	9.0	7268
H	16	0.00	.38	5.2	.399	8.7	7616
H	18	0.00	.38	10.0	.253	13.4	7614
I	0	0.00	.38	131.0	.224	168.8	7289
I	1	0.00	.38	194.0	.176	235.4	7288

TABLE 2

8.10.92 SAMPLE SUMMARY

LINE	ROW	DEPTH TOP (m)	DEPTH BOTTOM (m)	PCB WET CONC. (mg/kg)	IN-SITU MOISTURE	PCB DRY CONC. (mg/kg)	SAMPLE NO.
I	2	0.00	.38	111.0	.159	132.0	7287
I	3	0.00	.38	47.0	.406	79.1	7286
I	4	0.00	.38	99.2	.336	149.4	7285
I	5	0.00	.38	179.0	.376	286.9	7284
I	6	0.00	.38	42.8	.385	69.6	7283
I	7	0.00	.38	197.0	.333	295.4	7282
I	8	0.00	.38	230.0	.122	262.0	7281
I	9	0.00	.38	10.1	.388	16.5	7280
I	11	0.00	.38	6.2	.366	9.8	7345
I	13	0.00	.38	56.3	.166	67.5	7346
I	14	0.00	.38	455.0	.282	633.7	7343
J	0	0.00	.38	306.0	.183	374.5	7324
J	1	0.00	.38	293.0	.114	330.7	7323
J	2	0.00	.38	142.0	.154	167.8	7322
J	3	0.00	.38	86.1	.150	101.3	7321
J	4	0.00	.38	330.0	.301	472.1	7320
J	5	0.00	.38	241.0	.286	337.5	7319
J	6	0.00	.38	257.0	.217	328.2	7318
J	7	0.00	.38	224.0	.121	254.8	7315
J	8	0.00	.38	143.0	.342	217.3	7316
J	9	0.00	.38	74.9	.239	98.4	7317
K	0	0.00	.38	38.3	.376	61.4	7333
K	1	0.00	.38	1659.0	.197	2066.0	7344
K	2	0.00	.38	256.0	.370	406.3	7342
K	3	0.00	.38	516.0	.137	597.9	7341
K	4	0.00	.38	120.0	.507	243.4	7339
K	5	0.00	.38	42.2	.394	69.6	7340
K	6	0.00	.38	85.3	.148	100.1	7360
K	7	0.00	.38	66.5	.211	84.3	7361
K	8	0.00	.38	234.0	.175	283.6	7358
K	9	0.00	.38	118.0	.189	145.5	7362
P	4	0.00	.30	96.0	.384	155.0	7768
P	5	0.00	.23	1.0	.354	1.0	7769
P	6	0.00	.18	1.0	.605	1.0	7770
Q	3	0.00	.30	80.0	.273	109.5	7773
Q	4	0.00	.25	32.0	.321	47.0	7772
Q	5	0.00	.15	7.0	.287	9.9	7771
R	2	0.00	.25	46.0	.344	69.7	7776
R	3	0.00	.25	35.0	.559	79.5	7775
R	4	0.00	.20	22.0	.425	38.3	7774
S	2	0.00	.38	202.0	.247	268.3	7613
S	3	0.00	.38	3.4	.371	5.4	7667
S	4	0.00	.38	6.1	.279	8.5	7668
S	5	0.00	.38	6.5	.324	9.6	7671
S	6	0.00	.38	8.6	.294	12.2	7666
S	7	0.00	.38	1.0	.257	1.3	7670
S	8	0.00	.38	12.9	.300	18.4	7669
S	9	0.00	.38	1.0	.257	1.3	7672
T	1	0.00	.38	154.0	.237	201.8	7618
T	2	0.00	.38	28.0	.343	42.6	7608
T	3	0.00	.38	13.0	.373	20.7	7625

TABLE 2

8.10.92 SAMPLE SUMMARY

LINE	ROW	DEPTH TOP (m)	DEPTH BOTTOM (m)	PCB WET CONC. (mg/kg)	IN-SITU MOISTURE	PCB DRY CONC. (mg/kg)	SAMPLE NO.
T	4	0.00	.38	15.0	.391	24.6	7615
T	5	0.00	.38	4.7	.291	6.6	7627
T	6	0.00	.38	5.0	.207	6.3	7626
T	7	0.00	.38	3.7	.292	5.2	7629
T	8	0.00	.38	5.3	.264	7.2	7612
T	9	0.00	.38	3.3	.303	4.7	7624
U	1	0.00	.38	54.0	.148	63.4	7556
U	2	0.00	.38	7.4	.331	11.1	7551
U	3	0.00	.38	37.0	.259	49.9	7552
U	4	0.00	.38	12.0	.334	18.0	7573
U	5	0.00	.38	3.0	.437	3.0	7588
U	6	0.00	.38	2.9	.284	4.1	7585
U	7	0.00	.38	5.5	.312	8.0	7582
U	8	0.00	.38	6.5	.302	9.3	7590
U	9	0.00	.38	3.3	.284	4.6	7587
V	1	0.00	.38	109.0	.153	128.7	7557
V	2	0.00	.38	21.0	.361	32.9	7555
V	3	0.00	.38	43.0	.291	60.6	7554
V	4	0.00	.38	9.4	.293	13.3	7580
V	5	0.00	.38	1.0	.324	1.0	7583
V	6	0.00	.38	3.0	.272	4.1	7586
V	7	0.00	.38	3.1	.361	4.9	7589
V	8	0.00	.38	12.0	.300	17.1	7581
V	9	0.00	.38	7.9	.339	12.0	7584
W	1	0.00	.38	24.7	.208	31.2	7363
W	2	0.00	.38	11.2	.300	16.0	7368
W	3	0.00	.38	10.5	.324	15.5	7367
W	4	0.00	.38	2.9	.387	4.7	7568
W	5	0.00	.38	1.0		1.0	7575
W	6	0.00	.38	4.0	.291	5.6	7574
W	7	0.00	.38	3.3		3.3	7571
W	8	0.00	.38	5.1	.228	6.6	7572
W	9	0.00	.38	8.2	.304	11.8	7576
X	2	0.00	.38	4.8	.418	8.3	7560
X	3	0.00	.38	3.3	.417	4.3	7561
X	4	0.00	.38	3.9	.400	6.5	7567
X	5	0.00	.38	1.6	.298	2.3	7566
X	6	0.00	.38	1.5	.269	2.1	7565
X	7	0.00	.38	6.7	.260	9.1	7570
X	8	0.00	.38	2.5	.397	4.2	7563
X	9	0.00	.38	5.1	.313	7.4	7569
Y	1	0.00	.38	2.5	.165	3.0	7550
Y	2	0.00	.38	2.0	.102	2.2	7548
Y	3	0.00	.38	17.9	.393	29.5	7359
Y	4	0.00	.38	10.5	.417	18.0	7354
Y	5	0.00	.38	2.0	.360	3.1	7351
Y	6	0.00	.38	1.9	.404	3.2	7352
Y	7	0.00	.38	3.8	.371	6.0	7355
Y	8	0.00	.38	3.6	.296	5.1	7353
Y	9	0.00	.38	4.0	.330	6.0	7356
Z	4	0.00	.38	10.8	.408	18.2	7313

TABLE 2

8.10.92

SAMPLE SUMMARY

LINE	ROW	DEPTH TOP (m)	DEPTH BOTTOM (m)	PCB WET CONC. (mg/kg)	IN-SITU MOISTURE	PCB DRY CONC. (mg/kg)	SAMPLE NO.
Z	5	0.00	.38	9.3	.335	14.0	7326
Z	6	0.00	.38	4.1	.309	5.9	7309
Z	7	0.00	.38	3.0	.385	4.9	7306
Z	8	0.00	.38	3.0	.361	4.7	7312
Z	9	0.00	.38	5.6	.245	7.4	7310

TABLE 3

8.10.92 DEPTH VARIATION SUMMARY

LINE	ROW	DEPTH TOP (m)	DEPTH BOTTOM (m)	PCB WET CONC. (mg/kg)	IN-SITU MOISTURE	PCB DRY CONC (mg/kg)	SAMPLE NO.
A	2	.03	.08	23.0	.338	34.7	7619
A	2	.08	.18	6.3	.242	8.3	7617
A	2	.18	.28	21.0	.408	35.5	7695
A	2	.28	.38	1.0	.413	1.7	7694
D	1	0.00	.02	68.9	.179	83.9	7303
D	1	.02	.07	177.0	.185	217.2	7304
D	1	.07	.17	79.1	.206	99.6	7305
D	1	.17	.27	27.6	.210	34.9	7307
E	13	0.00	.03	506.0	.317	740.8	7611
E	13	.03	.08	245.0	.338	370.1	7610
E	13	.08	.18	14.0	.404	23.5	7607
E	13	.28	.38	1.0	.240	1.0	7699
F	1	0.00	.03	236.0	.218	301.8	7603
F	1	.03	.08	123.0	.128	141.1	7604
F	1	.08	.18	133.0	.143	155.2	7605
F	1	.18	.28	97.5	.175	118.9	7688
F	1	.28	.38	5.9	.272	8.1	7687
H	7	0.00	.03	27.0	.266	36.8	7547
H	7	.03	.08	129.0	.334	193.7	7546
H	7	.08	.18	11.0	.373	17.5	7545
H	7	.08	.18	51.0	.355	79.1	7710
H	7	.18	.28	3.7	.405	6.2	7711
I	14	0.00	.03	51.0	.318	74.8	7621
I	14	.03	.08	401.0	.186	492.6	7609
I	14	.08	.18	201.0	.291	283.5	7606
I	14	.18	.28	3.0	.375	3.5	7703
J	4	0.00	.03	34.5	.175	41.8	7544
J	4	.03	.08	57.0	.187	70.1	7543
J	4	.08	.18	376.0	.155	445.0	7542
J	4	.18	.28	15.0	.366	23.7	7712
K	1	0.00	.03	636.0	.147	745.6	7600
K	1	.03	.08	1004.0	.136	1162.0	7601
K	1	.08	.18	958.0	.180	1168.3	7602
K	1	.18	.28	1827.0	.147	2149.0	7715
V	3	0.00	.03	26.0	.324	38.5	7623
V	3	.03	.08	50.0	.324	74.0	7622
V	3	.08	.18	1.9	.287	2.4	7702
V	3	.18	.28	3.0	.289	3.0	7705
V	3	.28	.38	3.0	.248	3.0	7706
V	3	.38	.48	7.1	.248	9.5	7707

The contract laboratory reported that the chromatogram obtained from the GC/MS analyses showed a "classic" Aroclor 1260 material, a commonly used PCB formulation.

The area of the South Pond is 13.6 hectares (34 acres); the area of contamination defined in Figure 2 is 1.2 hectares (3 acres) or about 9% of the total. Using an average depth of contamination of 0.4 metre (16 inches), the volume of contaminated material is inthe order of 4800 m^3 (6300 cubic yards). The above is based on the conservative "dry weight" calculation.

4 STORAGE/REMOVAL OPTIONS

A brief review was made of a number of options related to containment/removal of the contaminated material.

One option is that of isolating the PCB contaminated areas from the uncontaminated areas. This option would include the placing of a continuous sheet pile wall as a separation between the areas. Given the irregular shape of the contaminated area, this would necessitate the enclosing of at least two separate areas part of which would be uncontaminated in order to have an efficient wall configuration. Given that the north area surrounds several sewer outfalls, one of which is of considerable size, and that the south area undoubtedly extends to the Coke Oven Brook entrance, rerouting of storm and sewage waters is a consideration, and if done would involve considerable additional costs. While the isolation option could permit the remainder of the material to be excavated without the danger of contaminated material moving into the excavation area, it would be a temporary measure at best, and the material would still require later removal/treatment. Additionally, construction would be awkward and costs would be considerable.

A second option is the removal of the contaminated material from the effected areas and its transport to secure storage at an approved location.

With the exception of the area immediately around the sewer outfall, the contamination is limited to the top 0.4 metre (16 inches) of the sediments. Removal of the material using the dredge designed and built for the bulk excavation would thus appear to be a reasonable approach. The initial dredging in other areas (uncontaminated) would give information as to possible suspension of contaminated material prior to start of the PCB excavation. If proven feasible and safe, then the dredge could be used to excavate the top forty centimetres of material.

As for transport and storage, there currently are four large oil storage tanks on SYSCO property, in reasonable proximity to the sludge transport pipeline. It is proposed that one of these tanks be given a careful check as to its overall integrity, and that it be refurbished to act as a secure storage for the material. A short lateral from the main pipeline to the storage tank could then be built.

The storage tank would require a structural check, and a complete test program for plate thickness and leakage possibilities, etc. In addition, a secure berm would be constructed around the tank to act as secondary containment in the event of an accident. Storage would be consistent with provincial PCB storage regulations.

Given the above, the dredge in conjunction with the transfer station and pipeline could be used to remove the contaminated material and transfer it to the storage tank. This could occur at a time when the incinerator would be involved in an annual maintenance shut down.

Cost estimates have not been prepared for the above options. However, it is considered that the removal option, while providing a more secure method of storage and permitting the complete excavation of the south pond material, would also cost less than the isolation option.

The preparation of cost estimates would require development of further details of the options, and detailed discussions with the Nova Scotia Department of the Environment as to the necessary precautions to be taken during removal and transport.

5 ONGOING WORK

As of October 5, 1992, Program Management Group has requested that further sampling and analyses be carried out in both the North and South Tar Ponds. This work has two prime objectives, firstly to delineate further a contamination free area for the first six months of dredging, and secondly to do further "strategic" sampling in selected areas to check for the possibility of other areas of contamination. This is not be intended to take the place of the Nova Scotia Department of Environment screening in advance of excavation, but to be an overall check for other possible "hot spots" and to allow forward excavation planning. The additional sampling is currently in progress. To further evaluate any differences between the 1987 and 1992 sampling, the sample archives from 1987 are being assessed for further analysis.

6 RECOMMENDATIONS

In addition to the ongoing work in section 5 above, it is recommended that the removal/storage option using the dredge and storage tank be further evaluated and cost estimates prepared. This will require development of additional details and review with the Nova Scotia Department of the Environment.